$\therefore\ \theta=67^\circ\ 43'$ nearly. $AB=2r\sec\theta=791.16$ feet.

$LK=2r(\sec\theta-1)=491.16$ feet.

Also solved by *J. SCHEFFER.*

CALCULUS.

119. Proposed by JOHN M. COLAW, A. M., Monterey, Va.

Rectify the Folium of Descartes, the equation of which is $x^3+y^3+3axy=0$.

Solution by G. B. M. ZERR. A. M., Ph. D., Professor of Chemistry and Physics. The Temple College, Philadelphia, Pa.

Substitute $-\frac{1}{\sqrt{2}}(x+y)$ and $-\frac{1}{\sqrt{2}}(x-y)$ for x and y, respectively, (revolving the axis through 135°) and the equation becomes

$$3y^2(a\sqrt{2}+2x)=x^2(3a\sqrt{2}-2x) \text{ or } 3y^2(a+x\sqrt{2})=x^2(3a-x\sqrt{2}).$$

$$\therefore\ y=\pm\frac{x\sqrt{(3a-x\sqrt{2})}}{\sqrt{[3(a+x\sqrt{2})]}}.$$

$$\frac{dy}{dx}=\frac{3a^2-2x^2}{\sqrt{[3(a+x\sqrt{2})^3(3a-x\sqrt{2})]}}.$$

$$\frac{ds}{dx}=\frac{\sqrt{[2(9a^4+12a^3x\sqrt{2}+12a^2x^2-4x^4)]}}{(a+x\sqrt{2})\sqrt{[3(a+x\sqrt{2})(3a-x\sqrt{2})]}}.$$

Let $a-x\sqrt{2}=2a\sin\theta$.

$$\therefore\ S=-\frac{a}{\sqrt{6}}\int\frac{\sqrt{(13-20\sin\theta+16\sin^3\theta-8\sin^4\theta)}}{1-\sin\theta}d\theta.$$

For the loop, $$S=\frac{2a}{\sqrt{6}}\int_{-\frac{1}{2}\pi}^{\frac{1}{6}\pi}\frac{\sqrt{(13-20\sin\theta+16\sin^3\theta-8\sin^4\theta)}}{1-\sin\theta}d\theta.$$

Also solved by *ELMER SCHUYLER.*

120. Proposed by G. B. M. ZERR, A. M., Ph. D., Professor of Chemistry and Physics, The Temple College, Philadelphia, Pa.

The axis of a paraboloid of revolution coincides with the generating line of a cylinder; the diameter of a cylinder and the latus-rectum of the parabola are each equal to the common altitude, a. Find the surface and volume of each part into which the paraboloid is divided by the cylinder.

Solution by the PROPOSER.

$x^2+y^2=az$ is the equation to the paraboloid.

Volume of paraboloid $=v_1=\frac{1}{2}\pi a^3$.

Surface of paraboloid $=s_1=\frac{1}{6}\pi a^2(5\sqrt{5}-1)$.